EGU2020-16939
https://doi.org/10.5194/egusphere-egu2020-16939
EGU General Assembly 2020

First regional SMOS Sea Surface Salinity products over the Baltic Sea and its oceanographic added-value

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Accurate satellite-based sea surface salinity (SSS) fields would address some gaps of knowledge and benefit the understanding of Baltic Sea salinity dynamics. In particular, these fields can contribute to the monitoring of long-term salinity changes and to the detection of periods with anomalous salinity. These products can also be very useful as initial fields and validation data for improving the existing numerical models.

The Baltic Sea is one of the most challenging regions for the retrieval of SSS from L-band satellite measurements. Nowadays, available EO-based SSS products are quite limited over this region both in terms of spatio-temporal coverage and quality. This is mainly due to several technical limitations that strongly affect the SMOS TB particularly over semi-enclosed seas, such as the high contamination by Radio-Frequency Interference (RFI) sources and the contamination close to land and ice edges. Besides, the sensitivity of TB to SSS changes is very low in cold waters and much larger errors are expected compared to temperate oceans. Salinity and temperature values are very low in this basin, which implies that dielectric constant models are not fully tested in such conditions. In the recent years, the Barcelona Expert Center team has been working on the development of innovative algorithms for improving the quality of SMOS TB and SSS retrievals dealing with the main processing issues.

In the context of the ESA Baltic+ Salinity Dynamics project (https://balticsalinity.argans.co.uk/), these methodologies have been adapted and consolidated towards the generation of the first regional SMOS SSS product (2011-2020) that would suit to the needs of the Baltic research community. Very recently, the first version of the Baltic+ SSS product has been produced (3-year series) and is currently under validation against in-situ measurements. The quality assessment of the SSS product in the Baltic Sea is also an issue and its representativeness must be carefully assessed. The basin is strongly stratified and then, the differences between SMOS measurements (first centimeters) and in-situ observations (few meters depth) can be noticeable. Differences are more probable during ice melting and high runoff events in spring where there might be a

freshwater layer at the top shallow surface. Feedback from the users will help identifying the limitations of the product. Additional technical developments will be addressed to meet the requirements of the communities working in the study of Baltic processes.

We will present at the conference the Baltic+ SSS v1 product and its added-value with respect to other existing EO-based datasets. The potential scientific impact of this satellite SSS product in advancing on-going regional research initiatives like the Baltic Earth Working Group on Salinity dynamics will be discussed.